

Claims

1. Catheter for the radiofrequency ablation of tissue, comprising at least one pair of bipolar electrodes adapted to function in bipolar mode, each bipolar
5 electrode comprising supply channels adapted for the perfusion of saline solution around the electrodes, the catheter further comprising at least two end electrodes arranged towards opposed ends of the catheter, on either side of the pair of bipolar electrodes, said end electrodes adapted to function in monopolar mode.
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2. Device according to claim 1, 2 or 3, wherein each bipolar electrode comprises at least two saline solutions supply channels (14a, 15a; 14b, 15b).
3. Catheter according to claim 1 or 2, wherein the liquid supply channels
15 with outlets (15a, 15b) arranged proximate the front and rear ends of the catheter are supplied with the saline solution independently of liquid supply outlets (14a, 14b) arranged proximate the center of the catheter.
4. Device according to claim 1 or 2, further comprising a central electrode
20 (8) arranged between the bipolar electrodes (4, 5), the central electrode adapted to function in monopolar mode.
5. Device according to any one of the preceding claims, further comprising
25 one or more thermocouples (16), said thermocouples being retractably mounted in the catheter and actionable so as to be inserted into tissue surrounding the catheter.
6. Catheter according to any one of the preceding claims, wherein the liquid
30 supply channel outlets are arranged at a distance (B) from the respective central and end monopolar electrodes, that is sufficient to avoid being in a region of coagulated tissue formed around said monopolar electrodes.

7. Apparatus for radiofrequency ablation of tissue comprising a catheter according to any one of the preceding claims and at least two independently controlled pumps for supplying saline solution to separate supply channels of each bipolar electrode.

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8. Apparatus according to the preceding claim, further comprising a temperature acquisition unit connected to thermocouples of the catheter.

9. Apparatus according to either one of the two preceding claims, further comprising an RF generator, whereby the independently controlled pumps, RF generator, and temperature acquisition unit are connected to a computing unit, such as a PC, for monitoring and controlling operations.

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10. Method of radiofrequency ablation of tissue, comprising the steps of :

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- providing a catheter having at least one pair of bipolar electrodes with saline solution supply channels, and at least two monopolar electrodes arranged towards opposed ends of the catheter on either side of the pair of bipolar electrodes;

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- inserting the catheter into a central region of the volume of tissue to be ablated;

- supplying electrical power to the monopolar electrodes to coagulate tissue therearound and seal the puncture performed by the catheter;

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- perfusing saline solution into the tissue surrounding the bipolar electrodes and supplying electrical RF energy to the bipolar electrodes for thermal ablation.

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11. Method according to the preceding claim, wherein the step of perfusing saline solution comprises supplying saline solution via supply channels (14a,

14b) arranged proximate the center of the catheter at a concentration lower than saline solution supplied to outlets (15a, 15b) arranged proximate opposed ends of the catheter.

- 5 12. Method according to either one of the two preceding claims, wherein prior to or during the step of operation of the bipolar electrodes, retractable thermocouples (16) mounted in the catheter are inserted at a certain depth into the surrounding tissue.